

REMARKS

This paper is filed in response to the official action dated January 25, 2005 (hereafter, the "official action"). This paper is timely-filed, as it is accompanied by a petition for an extension of time to file in the second month and a check covering the requisite fee of \$450.00.

Claims 1-19, 46, and 47 are pending in this application. Claims 16 and 17 have been withdrawn as being directed to a non-elected species. By the foregoing amendments, claims 1, 3, 4, 13, and 46 have been amended, and claim 6 has been canceled. Claims 1-5, 7-15, 18, 19, 46, and 47 remain at issue.

Support for the amendment to claim 1 may be found, for example, at the second full paragraph of page 7 of the specification and in original claim 6. The remaining claims have been amended to address typographical errors. No new matter has been added.

Claims 1, 3, 5, 10, 13, and 18 have been rejected under 35 U.S.C. §102(b) as anticipated by McCullough *et al.*, "Enhanced Electrical Conductivity in Regioselectively Synthesized Poly(3-alkylthiophenes)," J. Chem. Soc., Chem. Commun., pp. 70-72 (1992) ("McCullough"). Claims 1-3, 5-8, 10-14, and 46 have been rejected under 35 U.S.C. §§102(b) and 102(e) as anticipated by International Patent Publication No. WO 96/29356 to Kreuder *et al.* and U.S. Patent No. 6,114,490 to Kreuder *et al.*, respectively ("Kreuder"). Claims 3, 4, 8, 9, 15, 18, 19, 46, and 47 have also been rejected under 35 U.S.C. §103(a) as obvious over Kreuder.

Additionally, claims 3, 13-15, 18, 19, and 46 have been rejected under 35 U.S.C. §112, second paragraph, as indefinite. Further, claim 4 has been objected to for a typographical error. Claim 4 has been amended to address this error, and therefore this objection should be withdrawn.

The various bases for the claim rejections are addressed below in the order presented in the official action. Reconsideration of the application, as amended and in view of the following remarks, is solicited.

CLAIM REJECTIONS

I. 35 U.S.C. §112 rejections

Claims 3, 13-15, 18, 19, and 46 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The applicants respectfully traverse the rejections and submit that they should be withdrawn.

Claims 3 and 46 have been amended to correct typographical errors. Claim 13 has been amended to depend from claim 2 in order to provide antecedent basis for "the second substituent group" recited in claim 13 (and in claims 14, 15, 18, and 19, which depend from claim 13).

The applicants respectfully submit that claims 3, 13-15, 18, 19, and 46 were not indefinite under 35 U.S.C. §112, however, because a claim is considered definite as long as "the scope of the claims is clear so the public is informed of the boundaries of what constitutes infringement of the patent." *See* M.P.E.P. §2173. Nevertheless, the rejections of claims 3, 13-15, 18, 19, and 46 for indefiniteness should be withdrawn in view of the amendments to claims 3, 13, and 46 presented herein.

II. 35 U.S.C. §102

Claims 1, 3, 5, 10, 13, and 18 have been rejected as anticipated by McCullough. Claims 1-3, 5-8, 10-14, and 46 have been rejected as anticipated by Kreuder.¹ The applicants respectfully traverse the rejections.

It is well-established that each and every limitation of a claimed invention must be present in a single prior art reference in order for anticipation to occur. *See, for example, C.R. Bard, Inc. v. M3 Systems, Inc.*, 157 F.3d 1340, 1349 (Fed. Cir. 1998). The standard for anticipation is one of strict identity. This standard has not been satisfied with respect to claims 1-3, 5-8, 10-14, 18, and 46, as presented herein.

¹ U.S. Patent No. 6,114,490 to Kreuder *et al.* is the U.S. national phase of the international application corresponding to International Patent Publication No. WO 96/29356 to Kreuder *et al.*, and therefore the content of the two documents is identical. Accordingly, the 35 U.S.C. §102 rejections based on the two Kreuder documents are addressed simultaneously herein.

McCullough

McCullough discloses the preparation of poly(3-alkylthiophenes). Referring to scheme 1, the starting material is a disubstituted heteroaromatic group. Specifically, the starting material is thiophene substituted with a bromine atom at the 2-position and an alkyl group at 3-position. In step (i), metalation is performed at the 5-position of the starting material. In steps (ii), (iii), and (iv), substitution is performed to provide a BrMg substituent at the 5-position. In step (v), the resulting compound is polymerized to form a poly(3-alkylthiophene) polymer.

In the official action, the examiner asserted that the bromine and alkyl substituents initially present on the thiophene molecule shown in scheme 1 of McCullough represent first and second director groups, as recited in claim 1. However, claim 1 further recites that the nature and position of the first and second director groups regioselect the first position (at which metalation and electrophilic substitution are performed). Additionally, claim 1, as amended herein, recites that the nature and position of the first and second director groups regioselect the first position to be ortho to the first director group. Thus, the applicants submit that the bromine and alkyl substituents of the thiophene ring are not director groups, as recited in all pending claims, because they do not regioselect the first position, as explained below. Furthermore, the bromine and alkyl substituents of the thiophene do not regioselect the first position to be ortho to the first director group, as explained below.

Such regioselection occurs because of electronic interactions between the director groups and the metal in step (ii) of claim 1, which allow the director groups to 'direct' the first substituent group to the first position. Regioselection is exemplified in the application, for example, for cases where the aromatic or heteroaromatic group initially bears a hydrogen atom at the first position. In the reaction scheme shown on page 8 of the application, electronic interactions between the lone pairs of electrons of the C(O)NEt₂ director groups and the metal in the first step of the reaction scheme direct the metalation (and the subsequent electrophilic substitution) to be performed at the first position, which is ortho to the first director group.

The thiophene molecule shown in scheme 1 of McCullough does not include first and second director groups that regioselect the first position. The

bromine and alkyl substituents of the thiophene starting material are not director groups that regioselect the first position, as recited in claim 1, because neither substituent interacts with the metal in the manner described above to direct the metalation to be performed at the first position. For example, metalation and subsequent electrophilic substitution would take place at the 3-position of the thiophene ring whether or not the thiophene moiety was substituted with bromine and alkyl substituents (as shown in scheme 1). Thus, the R and the Br groups are not "directing" the metalation and subsequent substitution to take place at any particular position. Therefore, McCullough does not disclose or suggest all of the limitations recited in claim 1, and the rejections of claims 1, 3, 5, 10, 13, and 18 over McCullough should be withdrawn.

Furthermore, metalation occurs at a position that is para to the Br substituent and meta to the alkyl substituent of the thiophene molecule in scheme 1 of McCullough. In contrast, claim 1 recites that the nature and positions of the first and second director groups regioselect the first position to be ortho to the first director group. Therefore, McCullough does not disclose or suggest all of the limitations recited in claim 1, and the rejections of claims 1, 3, 5, 10, 13, and 18 over McCullough should be withdrawn for this additional reason.

Kreuder

Kreuder discloses polymers comprising p-phenylene units. Referring to scheme 1, reaction (E)→(F) illustrates the metalation of an aromatic group which is substituted with four substituents.

In the official action, the examiner indicated that reaction (E)→(F) discloses metalation of an aromatic group, which is substituted with four substituents, at first and second positions so as to provide a substituent at each of the first and second positions. However, metalation at the first position of the aromatic group is not performed by replacement of hydrogen, as recited in claim 1. Rather, metalation is performed by replacement of bromine.

For the foregoing reasons, the applicants respectfully submit that the anticipation rejections of claims 1-3, 5-8, 10-14, and 46 over Kreuder should be withdrawn. *III. 35 U.S.C. §103(a)*

Claims 3, 4, 8, 9, 15, 18, 19, 46, and 47 have been rejected under 35 U.S.C. §103(a) as obvious over Kreuder. The applicants respectfully traverse the rejections.

A *prima facie* case of obviousness must satisfy three legal requirements. *First*, there must be some suggestion or motivation, either in the references themselves, or in knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *Second*, there must be a reasonable expectation of success. *Third*, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. See M.P.E.P. §2143. These criteria have not been satisfied with respect to claims 3, 4, 8, 9, 15, 18, 19, 46, and 47, for at least the reasons provided below.

Kreuder neither discloses nor suggests performing metalation by replacement of hydrogen, as recited by all pending claims 1-19, 46, and 47. Kreuder merely discloses metalation by replacement of a halogen, for example, bromine. See Kreuder reaction schemes at columns 9 and 10, and at column 11, lines 61-63. Kreuder does not provide the skilled person with any motivation to modify the metalation method disclosed therein so as to perform metalation by replacement of hydrogen because Kreuder merely discloses the preparation of derivatives of poly(phenylenevinylene), and does not describe the utility or benefits of controlling the introduction of substituents by using directed metalation and substitution. The ability to control the introduction of substituents is advantageous because it provides the opportunity for selecting the substituents present on the repeat units of the polymer. Selecting substituents can be important for controlling the electronic and processing properties of the polymer, which can be advantageous for both device manufacture and use.

For the foregoing reasons, the applicants respectfully submit that the obviousness rejections of claims 3, 4, 8, 9, 15, 18, 19, 46, and 47 over Kreuder have been overcome and should be withdrawn.

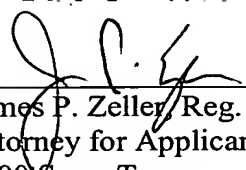
CONCLUSION

The applicants submit that the application is in condition for allowance. Should the examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, she is respectfully invited to contact the undersigned attorney at the indicated telephone number.

Respectfully submitted,

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